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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of: K. WELCHMAN *et al.*

Attorney Docket No: 20002.0093

Application No.: 09/811,579

Group Art Unit: 2877

Filed: March 20, 2001

Examiner: S. Nguyen

For: APPARATUS AND METHOD FOR AUTOMATED GAME BALL INSPECTION

APPEAL BRIEF UNDER 37 C.F.R. § 1.192

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Appellants file herewith an Appeal Brief (submitted in triplicate) in connection with the above-identified application, wherein claims 14-44 were finally rejected in the Office Action of August 13, 2002. The following is Appellants' Appeal Brief in accordance with 37 C.F.R. § 1.192(a):

I. REAL PARTY IN INTEREST

The real parties in interest in this appeal include the inventors named in this application: Kenneth A. Welchman, Steven A. Bresnahan, and Henry J. Conaty, Jr. As assignee, Acushnet Company is also a real party in interest.

II. RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to Appellants, the assignee, or the legal representative which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

The status of all the claims in the application are as follows:

11 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44

Claims	Status
1-13	Canceled
14-44	Rejected

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Claims 1-13 were canceled in Appellants' Response dated May 28, 2002. No claims have been allowed.

This appeal is directed to claims 14-44.

IV. STATUS OF AMENDMENTS

After conducting an in-person interview on October 15, 2002, Appellants submitted a Response to Office Action on the same day. This response would have amended the claims to put them in a form that the Examiner previously indicated would overcome his rejections.

For example, Appellants attempted to amend independent claim 14 to be directed toward a method of automatically inspecting a printed indicia on a game ball instead of a "surface treatment". Appellants attempted to amend independent claim 24 to be directed toward a method of automatically inspecting a logo on a golf ball instead of a "coating". Appellants attempted to amend independent claim 31 to be directed toward a method of automatically inspecting a printed image instead of an "indicia".

Prior to this response, some claims already included the same or similar terms. *See, e.g.,* claims 37 (inspecting a logo) and claim 31 (inspecting an indicia). Appellants amended the claims to use the terms "printed indicia", "logo", or "printed image" in all of the independent claims based on the statement in the Interview Summary that these changes would overcome the pending rejections.

The Examiner declined to enter the amendment, however, on the grounds that doing so would require further consideration and/or search of these claim terms.

No other amendments after final have been submitted.

Accordingly, Appellants consider the status of the claims to be as they were submitted in the Response to Office Action dated May 28, 2002.

V. SUMMARY OF INVENTION

The invention of this application is directed to methods of automatically inspecting surface treatments (*e.g.*, claim 14), coatings (*e.g.*, claim 24), indicia (*e.g.*, claim 31), or logo prints (*e.g.*, claim 37) on a game ball or golf ball to determine conformance with predetermined standards. For instance, the present invention may be used to automatically inspect the quality of printed text or of an image on the surface of a golf ball and compare the inspected text against a predetermined standard of that text or image. Similarly, the invention may be used to automatically determine whether a logo, a coating, or a surface treatment meets predetermined standards.

As explained in the specification at page 4, the spherical shape of a golf ball can make automated inspection of such things as print or logos on the three-dimensional surface difficult to achieve by two-dimensional analytical techniques found in other industries. The presence of dimples on the surface of the game ball can further complicate automated inspection of the ball. For instance, the curved, dimpled surface of a ball can cause a standard machine vision inspection system to have false rejections. While the occurrence of false rejections may be reduced by desensitizing the inspection system, this would cause the system to also be desensitized to identifying small defects on the print or image.

Thus, the golf ball manufacturing industry has heretofore relied on manual inspection to determine the quality of the various processes performed in manufacturing a golf ball. Because of the time needed to manually inspect a golf ball, it is not possible to manually inspect every ball. In addition, human error or oversight may result in some defects not being identified. These and other factors reduce the effectiveness of a manual inspection of golf balls.

As described in the specification, the present invention provides a more effective and more efficient way to inspect the quality of print, images, or the like on a golf ball so that undesirable or non-conforming conditions can be identified and corrected early.

Although the independent claims are directed to inspecting varying types of surface treatments (claim 14), coatings (claim 24), indicia (claim 31), or logo prints (claim 37), each of these claims additionally recites the steps of passing the game ball through an automated inspection system and determining conformance of the surface treatment, coating, indicia, or logo print to a predetermined standard.

The claims on appeal are fully supported by at least the following portions of the Specification:

<u>Claim(s)</u>	<u>Specification</u>
14, 23	Page 6, lines 18-22
15, 24	Page 7, lines 21-23
16-17, 25	Page 11, lines 21-24
18, 40	Page 23, lines 7-20
19-21, 26-28, 30-31, 33, and 35-37	Page 29, lines 3-32
22, 38	Page 21, lines 20-30
29, 34	Page 19, line 28 to Page 20, line 23
32, 39	Page 7, lines 21-23 Page 11, lines 21-24

VI. ISSUES

1. Whether claims 14-16, 18-20, 23-25, 27-28, 30-34, 36-39, and 42-44 are unpatentable under 35 U.S.C. § 103 over Kumagai in view of Yoshikawa.
2. Whether claims 17, 26, 35, and 40-41 are unpatentable under 35 U.S.C. § 103 over Kumagai and Yoshikawa in further view of Tao.
3. Whether claims 21-22 and 29 are unpatentable under 35 U.S.C. § 103 over Kumagai and Yoshikawa in further view of Yamada.

VII. GROUPING OF CLAIMS

Appellants submit that claims 14-44 should not stand or fall together.

Claims 14-44 are directed toward methods of automatically inspecting surface treatments, coatings, indicia, or logo prints on a game ball. As explained below, these claims, and the claims that depend from them, recite features that are not required by other claims.

Independent claims 14, 24, 31, and 37 have similar elements regarding automated inspection of a game ball to determine conformance with predetermined standards, but each claim is directed toward automatically inspecting different features of a game ball. Claim 14 is directed toward a method of automatically inspecting a surface treatment, claim 24 is directed toward a method of automatically inspecting a coating, claim 31 is directed toward a method of automatically inspecting an indicia, and claim 37 is directed toward a method of automatically inspecting a logo print.

As explained in the Specification, the present invention may be used to automatically inspect a variety of features on a game ball at a variety of times during manufacture of the ball. *See, e.g.*, Specification at page 19, lines 14-27. The differences between the terms used in the independent claims is explained throughout the Specification. *See, e.g.*, Specification at page 19, line 28 to page 20, line 15 (indicia and logo prints), page 27, line 29 to page 28, line 12 (surface treatments and coatings).

The features of the dependent claims likewise recite features not required by the other claims, as they recite features that also are not taught or suggested by the references relied upon by the Examiner. For instance, none of the references teaches or discloses generating an analysis signal indicative of whether the part of a game ball that is inspected conforms to a predetermined standard, as recited in claims 15, 25, 34, or 42. None of the references teaches or discloses transferring a game ball for further processing or rejecting it depending upon the

analysis signal generated as recited in claims 17, 26, 34, or 42. None of the references teach or disclose using at least one analysis algorithm to determine whether extraneous marks are present on a game ball, as described in claims 18 and 43.

Some of the dependent claims recite particular features for further enhancing the inspection process that also are not described by the cited references. For instance, none of the references teaches or suggests using an agent that can be illuminated under non-ambient conditions to aid inspection of the game ball, as recited in claims 19, 27, and 38. Moreover, none of the references teaches or suggests illuminating the game ball, detecting the illuminated agent with a machine vision system, and comparing the illuminated agent to a predetermined standard as described in claims 20, 28, 33, and 39. Claims 21, 29, 35, and 40 recite that a light source used to illuminate the game ball has a wavelength of about 300 to about 400 nm, which also is not described or suggested anywhere in the references relied upon by the Examiner.

Because the dependent claims recite additional features not found in the references, Appellants submit that none of the claims should stand or fall together.

VIII. ARGUMENTS

A. The Rejection Based on Kumagai in view of Yoshikawa is Erroneous and Must be Reversed

The Examiner rejected claims 14-16, 18-20, 23-25, 27-28, 30-34, 36-39, and 42-44 under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 6,031,933 to Kumagai in view of U.S. Patent No. Yoshikawa under 35 U.S.C. § 103. The basis for the rejection is as follows:

In the case, the different between Kumagai and/or Yoshikawa et al and/or Tao and/or Yamada, for example, Kumagai discloses defects of surface of a golf ball before applying coatings or marks of the golf ball according to a method and apparatus for inspection of the golf ball while the treatment surface of golf ball with a method for producing golf ball by coating film on the surface of the golf ball in Yoshikawa et al. Furthermore, Kumagai not only teach coating material such as characters, marks representing a trade name and player number on the surface of the golf ball but also detecting defect of the surface of the golf ball before coating materials with detecting defects on the surface of the golf ball (col. 10, lines 15-27 and figures 11A-11D), however, Kumagai does not teach that treatment surface of the golf ball in his invention because treatment surface of the golf ball is considered to be inherent such a coatings, marks, etching, or trade name of the golf ball. Thus, it would have been obvious to one having ordinary skill in the art to modify the invention of Kumagai by the treatment surface of the golf ball method as taught by Yoshikawa et al.

* * *

It is agreed that Kumagai does not teach applying a surface treatment to golf ball, however, this limitation is taught by Yoshikawa et al. at col. 1, lines 29-38.

Moreover, Yoshikawa et al does not discloses determining conformance of the surface treatment to predetermined standard (or threshold), Examiner is agreed with applicant, but Kumagai teaches that this limitation in col. 9 lines 30-67 and col. 10 lines 1-14 and figures 1-6. Thus, when the references are considered in combination, the recitation of claims would have been obviously suggested.

(Final Office Action of August 13, 2002, pages 5-6.)

Appellants are of the opinion that the Examiner has not addressed or has misinterpreted material limitations present in the claims. In addition, Appellants also believe that the Examiner has misinterpreted the references.

As stated above, the present invention is directed to a method of automatically inspecting a surface treatment, coating, indicia, or logo on a game ball by passing the game ball through an automated inspection system to determine whether the ball surface meets predetermined standards. In contrast, Kumagai does not disclose or suggest applying a surface treatment to a game ball or determining conformance to a predetermined standard.

In addition, an obviousness rejection requires (1) that the Examiner considers the totality of a reference and (2) that any proposed modification cannot render the reference unsatisfactory for its intended purpose. *See, e.g.*, MPEP §§ 2141.02 and 2143.01. Kumagai expressly *teaches away* from the present invention through instructions to exclude or ignore any portions of the golf ball having characters, trademarks, and numbers on the surface of the golf ball as these marks prevent the identification of the defects:

Often, characters and marks representing a trade name and player number are printed on the golf ball. Such a mark constitutes a part of large variations among the variation data. Without an expedient, the mark can be detected by binary processing as is the defect. As compared with dimples and a defect which are regarded mere concave depressions in the white background, a mark printed in black, blue or red appears as a portion with a very low brightness on the two-dimensional image. If a portion with a brightness below a certain level appearing on the tow-dimensional image is removed from the region to be inspected, then the mark is excluded from the object to be detected.

Kumagai, col. 10, lines 15-26 (emphasis added). In other words, Kumagai explicitly teaches to ignore characters and marks such as a trade name in order to more accurately find physical defects that may exist in the cover of the ball. As such, any modification of Kumagai to inspect these features of a game ball necessarily requires ignoring the fundamental teaching of this reference. As such, the rejection based upon Kumagai proposes a modification to the disclosure

that would render the reference inoperable for its intended purpose. Such a modification is not permitted.

Furthermore, Kumagai discloses a method and apparatus for detecting "defects," such as flaws, weld marks, depressions left at the gate, and foreign matter inclusions on the golf ball surface, wherein the defect, or indentation mark, appears as an abrupt change, or variation, in brightness on the two-dimensional image. *See* Column 2, lines 49-52; Column 9, lines 7-9. Any variations in brightness are then compared to baseline variation data associated with dimples measured at the same time, on the same ball to determine whether the variation is significant enough to call it a defect. *See* Column 9, lines 50-53. Kumagai does not even suggest using predetermined standards, a pre-recorded image, or a reference image, as presently recited.

In addition, while Yoshikawa generally discloses a pressure plasma treatment for golf balls intended to improve adhesion between a golf ball and a finish coating (Abstract), Yoshikawa does not cure the deficiencies of Kumagai. For example, no combination of the Kumagai method for detecting indentations and the Yoshikawa plasma treatment method would result in the ability to compare an applied surface treatment to a predetermined standard of a surface treatment, especially in light of the Kumagai teachings to exclude or ignore any portions of the golf ball with surface treatment. Thus, one of ordinary skill in the art would have had no reasonable expectation of success of arriving at the presently claimed invention by combining a reference that teaches away from the presently claimed invention with another reference that lacks all the required elements.

B. The Rejection Based on Kumagai and Yoshikawa in further view of Tao is Erroneous and Must be Reversed

The Examiner rejected claims 17, 26, 35, and 40-41 under 35 U.S.C. § 103 as being unpatentable over Kumagai and Yoshikawa in further view of U.S. Patent No. 5,732,147 to Tao. The Examiner's basis for this rejection is provided above.

Appellants respectfully submit that Tao does not cure the deficiencies of either Kumagai or Yoshikawa. Tao generally discloses an image processing system using cameras and image processing techniques to identify undesirable objects on a conveyor line. *See* Abstract. The method disclosed by Tao is similar to Kumagai in that it measures the differences in reflectance levels for each apple to identify physical defects, *i.e.*, rots, decay, limb rubs, scars, cavities, holes, bruises, black spots, and damage from insects. *See* Column 9, lines 24-25 and 34-36; Column 10, lines 15-20. The variation in reflectance levels is measured simultaneously against other parts of the same apple. *See* Column 10, lines 36-40.

Tao does not disclose or suggest application of a surface treatment, or determination of conformance of a surface treatment with a predetermined standard or reference image, as presently claimed. Thus, one of ordinary skill in the art would have lacked the motivation to use any combination of Kumagai, Yoshikawa, or Tao to arrive at the presently claimed invention.

Moreover, Tao teaches to detect physical defects in apples by changing the temperature of the apples and measuring for temperature gradients across the surface of the apple. According to Tao, physical defects in apples have a different heat capacity than "healthy" portions of the apple, and therefore can be detected using a thermal gradient. It is unclear how this method could be applied to inspecting a game ball.

C. The Rejection Based on Kumagai and Yoshikawa
in further view of Yamada is Erroneous and Must be Reversed

The Examiner rejected claims 21-22 and 29 under 35 U.S.C. § 103 as being unpatentable over Kumagai and Yoshikawa in further view of Yamada (JP 08 309 262). Appellants once again disagree with this rejection for similar reasons provided above.

Like Tao, Yamada also does not cure the deficiencies of either Kumagai or Yoshikawa. Yamada generally discloses a method for measuring the thicknesses of a clear coating film on a golf ball by obtaining the bright and dark images of the coating film. *See Abstract.* Yamada does not disclose or suggest, however, application of a surface treatment, or determination of conformance of a surface treatment with a predetermined standard or reference image, as presently claimed. Thus, no combination of Kumagai, Yoshikawa, or Yamada would result in the presently claimed invention.

CONCLUSION

In view of the foregoing, it is respectfully requested that the Examiner's rejections be reversed. A petition for a 2-month extension of time is submitted herewith, with authorization to charge the appropriate fee. Should any other fee be required at this time, please charge such fee to Swidler Berlin Shreff Friedman, LLP Deposit Account No. 195127, Order No. 20002.0093.

Respectfully submitted,
SWIDLER BERLIN SHREFF FRIEDMAN, LLP

Dated: March 13, 2003

By: 

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IX. APPENDIX

14. A method of automatically inspecting a surface treatment on a game ball, which comprises the steps of:
 - applying the surface treatment to the game ball;
 - passing the game ball through an automated inspection system; and
 - determining conformance of the surface treatment to a predetermined standard.
15. The method of claim 14, wherein the step of determining conformance further comprises the step of:
 - generating an analysis signal indicative of whether the surface treatment conforms to the predetermined standard.
16. The method of claim 15, wherein the step of determining conformance further comprises the step of:
 - using the analysis signal to perform a further operation on the game ball.
17. The method of claim 16, wherein the step using the analysis signal further comprises the step of:
 - transferring the game ball for further processing or rejecting the game ball depending on the analysis signal generated.
18. The method of claim 14, wherein the step of determining conformance further comprises the step of:
 - using at least one analysis algorithm to determine whether extraneous marks are present on the game ball, wherein the extraneous marks comprise missing characters, ink smudges, ink smears, shadowing, missing sections of print, partial character thickness deviation, complete character thickness deviation, or misaligned characters; and
 - using the analysis algorithm to transfer the game ball for further processing or reject the game ball depending on the analysis signal generated.

19. The method of claim 14, wherein the step of applying a surface treatment on a game ball comprises the step of:
- applying an agent to the surface of a game ball, wherein the agent is able to be illuminated under non-ambient lighting conditions.
20. The method of claim 19, wherein the step of passing the game ball through an automated inspection system further comprises the steps of:
- illuminating the game ball;
- detecting the illuminated agent with a machine vision system; and
- comparing the illuminated agent to the predetermined standard with a machine vision engine.
21. The method of claim 20, wherein the step of illuminating the game ball further comprises the steps of:
- providing a light source having a wavelength of about 300 nanometers to about 400 nanometers;
- directing the light source at the game ball.
22. The method of claim 21, wherein the step of providing a light source further comprises:
- providing an environmental modification device to eliminate dimple effects, wherein the dimple effects comprise glare, shading, or image distortion.
23. The method of claim 14, wherein the predetermined standard comprises a reference image of an acceptable surface treatment.
24. A method of automatically inspecting a coating on a game ball, which comprises the steps of:
- applying the coating to the game ball;
- passing the game ball through an automated inspection system; and
- determining conformance of the coating to a predetermined standard.

25. The method of claim 24, wherein the step of determining conformance further comprises the step of:
generating an analysis signal indicative of whether the coating conforms to predetermined standards.
26. The method of claim 25, wherein the step of determining conformance further comprises the step of:
using the analysis signal to transfer the game ball for further processing or reject the game ball depending on the analysis signal generated.
27. The method of claim 24, wherein the step of applying a coating on a game ball comprises the step of:
mixing an agent with the coating, wherein the agent is able to be illuminated under non-ambient lighting conditions.
28. The method of claim 24, wherein the step of passing the game ball through an automated inspection system further comprises the steps of:
illuminating the game ball;
detecting the illuminated agent with a machine vision system; and
comparing the illuminated agent to a predetermined standard with a machine vision engine.
29. The method of claim 28, wherein the step of illuminating the game ball further comprises the steps of:
providing a light source having a wavelength of about 300 nanometers to about 400 nanometers; and
directing the light source at the game ball.
30. The method of claim 24, wherein the predetermined standard comprises a reference image of an acceptable coating.
31. A method of automatically inspecting an indicia on a game ball, which comprises the steps of:
applying the indicia to the game ball;

- passing the game ball through an automated inspection system; and determining conformance of the indicia to a predetermined standard.
32. The method of claim 31, wherein the step of applying the indicia to the game ball comprises the steps of:
- combining at least one ink with at least one agent to obtain a mixture, wherein the agent is able to be illuminated under non-ambient lighting conditions; and
- applying the mixture to the game ball.
33. The method of claim 31, wherein the step of passing the golf ball through an automated inspection system further comprises the steps of:
- illuminating the game ball;
- detecting the illuminated agent with a machine vision system; and
- comparing the illuminated agent to the predetermined standard with a machine vision engine.
34. The method of claim 31, wherein the step of determining conformance further comprises the steps of:
- generating an analysis signal indicative of whether the indicia conforms to the predetermined standard; and
- using the analysis signal to transfer the game ball for further processing or reject the game ball depending on the analysis signal generated.
35. The method of claim 33, wherein the step of illuminating the game ball further comprises the steps of:
- providing a light source having a wavelength of about 300 nanometers to about 400 nanometers; and
- directing the light source at the game ball.
36. The method of claim 31, wherein the predetermined standard comprises a reference image of an acceptable indicia.

37. A method of automatically inspecting a logo print on a game ball, which comprises the steps of:
- applying the logo print to the game ball;
 - passing the game ball through an automated inspection system; and
 - determining conformance of the logo print to a predetermined standard.
38. The method of claim 37, wherein the step of applying a logo print to the game ball further comprises the steps of:
- preparing a mixture of at least one ink and at least one agent, wherein the agent illuminates upon application of a light source; and
 - applying the mixture to at least a portion of the game ball.
39. The method of claim 38, wherein the step of passing the game ball through an automated inspection system further comprises the steps of:
- illuminating the game ball;
 - detecting the illuminated agent with a machine vision system; and
 - comparing the illuminated agent to the predetermined standard with a machine vision engine.
40. The method of claim 39, wherein the step of illuminating the game ball further comprises the steps of:
- providing a light source having a wavelength of about 300 nanometers to about 400 nanometers; and
 - directing the light source at the game ball.
41. The method of claim 40, wherein the step of providing a light source further comprises:
- providing an environmental modification device to eliminate dimple effects, wherein the dimple effects comprise glare, shading, or image distortion.
42. The method of claim 37, wherein the step of determining conformance further comprises the steps of:
- generating an analysis signal indicative of whether the logo print conforms to the predetermined standard; and

using the analysis signal to transfer the game ball for further processing or reject the game ball depending on the analysis signal generated.

43. The method of claim 37, wherein the step of determining conformance further comprises the step of:
 - using at least one analysis algorithm to determine whether extraneous marks are present on the game ball, wherein the extraneous marks comprise missing characters, ink smudges, ink smears, shadowing, missing sections of print, partial character thickness deviation, complete character thickness deviation, or misaligned characters; and
 - using the analysis algorithm to transfer the game ball for further processing or reject the game ball depending on the analysis signal generated.
44. The method of claim 37, wherein the predetermined standard comprises a reference image of an acceptable logo.